LECTURE

INTRODUCTORY TO THE

COURSE ON ANATOMY,

IN THE

UNIVERSITY OF PENNSYLVANIA,

BY

JOSEPH LEIDY, M.D.

PUBLISHED BY THE CLASS.

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University of Pennsylvania,
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A Meeting of the Class was held for the purpose of requesting for publication the Introductory Lectures of the Professors. Robert Stewart being called to the Chair, and Mr. R. R. Porter, of Tennessee, being appointed Secretary, a Committee was appointed to carry out the intention of the meeting, consisting of one from each State or Province, as follows:—

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CORRESPONDENCE.

Philadelphia, *October* 20, 1853.

Dear Sir: We, the undersigned, in behalf of the Medical Class of the University of Pennsylvania, respectfully solicit a copy of your appropriate Introductory Address for publication.

Expressing the wish that you may comply with our request, and the wishes of the gentlemen we represent,

We remain, with esteem and regard, your obedient servants,

Robert Stewart,
J. R. Hill,
J. Cheston Morris,
T. S. Easton,
G. Johnson,
B. C. Ludlow.

To JOSEPH LEIDY, M. D.

Philadelphia, *October* 21, 1853.

Messrs. Robert Stewart, J. R. Hill, J. Cheston Morris, T. S. Easton, G. Johnson, and B. C. Ludlow—

My Dear Sirs: It affords me pleasure to comply with your wishes, and those of the Medical Class which you represent, in furnishing a copy of my Introductory Lecture to the Anatomical Course of the present session.

With respect, I subscribe myself, your friend,

JOSEPH LEIDY.

LECTURE.

GENTLEMEN:—

THE position which I hold in this University, by appointment of its honorable Board of Trustees, is the highly responsible one of teaching anatomy. I deem it responsible because it is at the threshold of the profession you have chosen, and is the guiding thread through the intricate departments of my distinguished colleagues.

The perfection of medicine demands an intimate acquaintance with man in all his relations to nature; for as man is part of the latter, so he partakes of all its conditions. In this view, all branches of science have a bearing upon medicine, whether it be the study of a pebble, an insect, the human body, or of a world.

Anatomy, which elucidates the physical structure of organized bodies, is the immediate basis of physiology, and is the first great step towards acquiring a knowledge of our profession. Except, however, the most general principles of the science, it is more restrictedly human anatomy, in its application to surgery and the practice of medicine, which I am to teach you.

Although universally acknowledged to be of the greatest utility, no other branch of knowledge has met with so much opposition to its cultivation as anatomy.

The greatest obstacle with which this science has always had to contend arises from the horror inspired by the sight of a corpse, with which is associated the disagreeable idea of our own death. Added to this, at all times there has existed a religious veneration for the remains of friends and relatives, and even for those of strangers and enemies, which has led to their final disposal without mutilation, according to the peculiar customs of the country.

In the earliest period of the history of nations, the first ideas of human anatomy were obtained from analogies presented in the preparation of animals for food or for the altar of some divinity. In sacred offerings, the priests examined the viscera and other organs with the view of obtaining from them indications of the future intentions of the Deity. Even from this very ancient source, anatomy has obtained some names which are still in use. Thus, the word *omentum* signifies the commencement of the prediction, and was so called because it is the part first observed upon opening the abdominal cavity.

Among certain nations, a slight knowledge of human anatomy was directly obtained from the horrid custom of offering human sacrifices to their bloodthirsty gods; as was practised by the Druids or priests of ancient Gaul, and also occasionally by the most ancient Grecians, and the Scythians. In like manner, it is found that the modern Feejees become quite familiar with the existence and relative position of the large viscera of the great cavities, from the vile custom of feasting upon the bodies of captives of war and those of their diseased or aged friends and relatives.

The Egyptians, among the ancients, probably acquired the most knowledge of visceral anatomy, from the frequent opportunity afforded of examining the internal organs in the process of embalming the dead. Embalmment was performed by an inferior order of priests; and an initiatory step to the employment of antiseptics, consisted in dragging out the brain by means of a hooked instrument introduced into the cavity of the cranium through the nose, and removing the thoracic and abdominal viscera through an incision made in the side of the body with a sharp stone. The Egyptians, however, had such a religious horror of touching a corpse, that even those who were employed to embalm their dead were as much despised and obliged to conceal themselves from the populace as a modern executioner.

The distinguished Jewish lawgiver, Moses, who was learned in all the knowledge of the Egyptians, very stringently prohibited his people from touching the dead, so that they learned nothing of anatomy except what was taught from analogy in the lower animals.

Though medicine is recommended in the Old Testament as a

succor from God, and it is ordered to honor the physician,* yet the Jews did not consider this sufficient reason for studying anatomy. Their medical knowledge, like that of all the ancients, was entirely empirical or experimental. The formulas of their remedies and the diseases for which they were employed were inscribed upon the vestibule of the temple of Jerusalem; but the pious king Hezekiah ordered them to be removed, so that the people should not seek their health from them, but apply directly to God for aid.

The nations of Asia, from the remotest antiquity, have at all times held the highest veneration for the dead, and would never permit them to be desecrated by the knife of the anatomist; and, at the present period in China, the knowledge of the human structure is as imperfect as it was several thousand years ago.

According to the historical records which we possess of ancient Greece, Chiron, who is said to have been a centaur, taught the sons of the kings gymnastics, the chase, the art of war, music, astronomy, philosophy, and the anatomy and surgery of man and the horse.

Hercules and Esculapius were pupils of Chiron, and the latter was subsequently worshipped by the Grecians as the god of medicine.

At this early period, the study of human anatomy did not extend farther than the exterior of the body, and was considered even of more utility to the sculptor than to the physician. The whole art of medicine consisted in preventing and curing diseases and deformities by means of exercise; and that of surgery in nothing more than the dressing of wounds. Such, indeed, was the knowledge of Machaon, a son of Esculapius, who proved of so much service to the warriors at the siege of Troy, that, in admiration of his talents, Homer is led to say:—

> A wise physician, skilled our wounds to heal,
> Is more than armies to the public weal.—*Il.* xi. 630.

As an instance of the surgical skill of Machaon, which called forth the praises of the greatest poet of antiquity, Homer states that, when Menelaus was wounded by an arrow, which, from

* Ecclesiasticus, xxxviii.

the description, appears only to have penetrated the skin of the breast, the wise physician removed the shaft, but left the head behind:—

> Then sucked the blood, and sovereign balm infused,
> Which Chiron gave, and Esculapius used.—*Il.* iv. 251.

Under the same circumstances, a modern surgeon would have removed the arrow, and felt assured that nature alone would do all else that was required.

The Grecians held the same prejudice against touching the dead that existed among the Egyptians and Orientals, and their belief that the souls of the departed wandered up and down the shores of the river Styx until their bodies were buried, rendered dissection impossible. They also held it as a pious duty to bury even a single human bone when accidentally found, and the Athenians went so far, in their care for immortal souls, that they condemned one of their generals to death, because, after a successful battle, in pursuing the enemy, he left the dead unburied.

The descendants of Esculapius, who were called Asclepiades, continued to practise physic down to the time of Hippocrates, but their art was entirely empirical, and did not require a knowledge of anatomy. They treated diseases by certain formulas or recipes which were transmitted from father to son, and generally were of the most absurd character. Indeed, the profession of medicine of the Asclepiades was based upon no better information than that possessed by certain old women of our own day, who are famous for powwowing burns and concocting poultices and gargles, not unfrequently of the most execrable character.

Hippocrates, who is now viewed by our profession as the father of medicine, was the first to break through the routine of empirical practice. Usually it is stated he separated medicine from philosophy, but this is incorrect, for he only separated it from the false notions of the so-called schools of philosophy, and gave to it some claims of being a science, and thus really made it a branch of philosophy. Hippocrates industriously collected the various medical, physiological, and anatomical observations and opinions which were scattered among the temples and schools of learning, and diligently compared and classified them, and deduced results which led him to consider anatomy as the only true basis of me-

dicine. Anatomy and physiology, as taught in the ancient Grecian schools of philosophy, were made up of observations on the exterior of the human body, of a few facts derived from dissections of the inferior animals, and of a host of opinions and speculations for the most part not only exceedingly erroneous, but so ridiculous that in modern times we are inclined to think the philosophers were jesting. Plato taught the œsophagus was a passage for food, and the trachea was a tube to convey water to refresh the lungs. Tendons, nerves, and ligaments were confounded together; arteries were supposed to be passages for air, or the animal spirits, as it was called; and the blood was supposed to move to and fro in the veins. Although the school of Pythagoras was sufficiently observant in the dissection of the lower animals to discover the tympanum and labyrinth of the internal ear, yet it was satisfied with the idea that the bones were condensed earth and water, and the nails were the terminations and expansions of nerves or tendons hardened by exposure to the air. Alcmeon, one of the disciples of the school of Pythagoras, in dissecting a goat, discovered the Eustachian tube, and forthwith declared the animal breathed through its ears.

We may well consider the utility of observation, if it is to lead to results such as those just indicated, and it may be readily conceived that, from materials of this character, Hippocrates had an arduous task to perform in attempting to separate truth from error; and as he had no opportunity of making dissections of the human body, we cannot wonder that the works which are attributed to him contain much that is false and absurd. As an instance among the many remarkable errors into which the father of medicine fell, and with respect to which, to us, it is difficult to conceive how they could originate, he relates that the spermatic liquid descends from the head in the vicinity of the ears towards the genitalia, and for this reason it is, those who have their ears cut off cannot reproduce their species; and eunuchs cannot engender because the spermatic liquid, which ordinarily passes through the testicles in its way to the urethra has its communication with the latter destroyed. Nevertheless, there is much to admire in the works of Hippocrates, and in relation to osteology, the facts which he collected are generally correct.

On the authority of Pausanias, it is usually stated by the his-

torians of medicine, that Hippocrates had had a human skeleton made of brass, which he dedicated to the oracle of Delphi, and thus facilitated the study of osteology. This statement, however, without doubt is incorrect, for a natural human skeleton would have been required for a model; and the words of Pausanias, correctly translated, read thus:—

"Among the gifts offered to Apollo was an image in brass of a man whose flesh was consumed by a long disease, so that only the bones remained. It is said, at Delphi, the offering was made by Hippocrates, the physician." From this it appears what has been supposed to have been a skeleton, was only the statue of a much emaciated person; and as human anatomy, in the time of Hippocrates, consisted in the study alone of the exterior of the body, a very thin subject was well adapted to the purpose.

Aristotle, who was the personal friend and preceptor of Alexander the Great, and the most illustrious of ancient naturalists, comparative anatomists, and physiologists, could never obtain an opportunity to study human anatomy. Although Alexander furnished him with an immense annual income, and the services of several thousand men who were constantly employed in travelling to collect animals for his investigations; and although the mighty conqueror would not hesitate a moment to immolate myriads of his fellow creatures to his own ambition, yet his superstitious prejudices would not permit the dissection of a single human being. In that splendid monument to the zeal, talent, and industry of Aristotle, which is yet preserved in our libraries, the *Historia Animalium*, in a few words the author states: "The internal parts of man yet remain unknown, but, from the outward form, we may infer they do not differ from those of other animals."

Thus far, gentlemen, my lecture presents to you one of the most remarkable and melancholy instances which can be found recorded, of man being totally blinded by superstition to the strongest of his instincts—that of self-preservation. Thousands of human victims have been sacrificed upon the altar of a barbarous divinity, and all nations, at all periods of their history, in war would slay incalculable numbers of their fellows and commit the most horrible and revolting crimes, but for 4,000 years a single body was not dissected, although mankind were incessantly engaged in seeking the causes and cure of diseases which afflicted

them. Very correctly Vicq d'Azyr remarks: "Anatomy is, perhaps, among all sciences, that of which the advantages have been most celebrated, but of which the progress has been the least favored."

About three centuries prior to the Christian era, Egypt, the cradle of civilization, suddenly emerged from the darkest superstition, in which almost every animate and inanimate object was worshipped as the representative of a deity, and shed a light over the earth which, though it subsequently became dimmed, yet never has been extinguished. The kings of Egypt who succeeded Alexander, down to the time of the beautiful queen Cleopatra, felt the importance of art, literature, and science, upon the glory and prosperity of empires, and therefore not only overthrew the obstacles which impeded their progress, but encouraged them by every means in their power. Ptolemy I., who is more worthy of being considered great than Alexander, presented every inducement to men of learning, artists, poets, and seulptors to settle in Alexandria. He cultivated their society, and opened his palace to their reception. He founded a university in which all branches of knowledge were taught, and established a library which, under his successors, increased to 700,000 volumes; but as these were manuscripts, they probably did not amount to more than 40,000 of our printed volumes.

In the University of Alexandria, for the first time in the history of the world, anatomy was taught from dissection and demonstrations upon the human body. Not only did the kings of Egypt permit the dissection of dead bodies, but also those of living malefactors, condemned to death, who were thus made to answer a useful purpose in atonement for their crimes. In the Alexandrian school of medicine, flourished the anatomical professors, Herophilus, Eudamus, Erasistratus, and others; but unfortunately for the honor of their names, their writings are lost to us, and we only know of their attainments through succeeding authors, especially Galen.

Herophilus and Eudamus first indicated that the nerves were connected with the brain and spinal marrow and conducted sensation; that the tendons belong to the muscles; and the ligaments to the bones. These three systems, as before stated, had previ-

ously been confounded together. Erasistratus discovered the lacteals, but their existence was afterwards entirely forgotten until rediscovered by Asellius in the seventeenth century.

The great library of Alexandria was subsequently destroyed, and this destruction has usually been imputed entirely to the Arabians, but I am inclined to believe with the truthful historian, Gibbon, that it mainly suffered from fire in the conquests of the Romans, and also in some measure through the excessive zeal of the early Christians in endeavoring to extinguish all traces of ancient idolatry. In the common wreck of the learning of Egypt we doubtless have lost not only all the labors of the Alexandrian anatomists, but also many other valuable scientific works.

The ancient Romans never did anything for the advancement of anatomy and physiology. Their custom of burning the dead deprived those who might desire it of the means of dissecting; and, besides this, their laws and religion forbade the mutilation of human bodies under the severest penalties. Even Celsus, the most celebrated of the Roman physicians, did nothing more in anatomy than prepare an abridgment of the writings of previous authors.

In the second century of the Christian era, Claudius Galenus, or Galen, as he is commonly called, was born at Pergamus, in Asia Minor. He became eminent as a literary scholar, physician, surgeon, and philosopher, and wrote upon anatomy, physiology, pathology, and the diagnosis of diseases. He informs us that in his time human anatomy was not taught by dissection and demonstration; and the only opportunities afforded for its practical study were from the discovery of the inanimate bodies of infants, left by cruel parents to die from exposure, or from those of persons who were occasionally found assassinated on the highways and fields in lonely places. Examinations of these had to be conducted with secresy and despatch, and consequently carelessly. Osteology was studied from bones and fragments of others accidentally found in caverns, tombs, and desert places. Galen visited Alexandria to study osteology, in which city, he states, a human skeleton was preserved. Being deceived by the outward resemblance of apes to man, he made them a substitute in his dissections; and in this way has been led to attribute much to the human structure which does not belong to it.

After the death of Galen, anatomy ceased to be cultivated for more than twelve centuries; and this illustrious writer became an oracle, which, in the minds of physicians, philosophers, and theologians, could not err; and it was almost as dangerous to differ from his supreme authority as it was to utter some heresy against religion.

In the seventh century, the Arabians, through the influence of arms and the religion of Mahomet, commenced to play a conspicuous part in the world's drama. Their sacred writings, the Alcoran, proscribe all sciences except that of medicine, but this did not include anatomy, for it is particularly forbidden; and the touching of the dead is viewed as an impurity which could only be removed after frequent ablutions and tedious ceremonies.

Under Amrou, the Arabians made the conquest of Egypt, and by order of the caliph, Omar, the destruction of the famous library of Alexandria was completed.

Two centuries afterwards, the Saracens displayed a taste for literature and science, but continuing to view the dissection of the human body as an impiety, nothing was done for the cultivation of anatomy. Their most distinguished physicians, Rhazes, Averroës, and Avicenna, contented themselves with translating and commenting on the works of Hippocrates, Aristotle, Galen, and others, which served rather to perpetuate errors than to advance the cause of medicine.

The writers of fiction of our own day have given some notoriety to the Jews living among the Saracens, for unusual skill in the practice of physic; but their information was no better than that of their Mahometan contemporaries, for their ancient prejudices still clung to them, and prevented them from cultivating the studies of anatomy and physiology.

To Frederick II., Emperor of Germany in the thirteenth century, is due the credit of having desired to become the restorer of literature, the arts, and the sciences. He made a law prohibiting all persons from the practice of surgery without having been previously instructed in anatomy. That this might be observed, at the suggestion of his physician, Martianus, he established a professorship, of which the duty was to demonstrate anatomy by the dissection of a human body every five years. The zeal exhibited by the surgeons and physicians in following this newly-created

course, engaged the attention of other universities in the enlightened parts of Europe, but particularly that of Bologna, in Italy. Little progress, however, appears to have been made for more than a century, for the most celebrated universities were not permitted to have more than one or two bodies yearly, for the purposes of dissection, and these were obtained only after solemn solicitation, and an especial bull from the successors of St. Peter.

In the fourteenth century, Mundinus, Professor in the University of Bologna, dissected two human bodies, and wrote an anatomical work, the *Anatomia Mundini*, which obtained a high reputation, and passed through several editions.

Human anatomy, for several centuries afterwards, was taught in the principal universities of Europe, but in a manner which in modern times cannot fail to excite a smile. Ordinarily, a single body was dissected annually, and the lectures were a mere commentary on the works of Galen and Mundinus. The professor, decked in a huge wig, sat with great solemnity in an elevated chair or pulpit, at some distance from his subject, so as not only to avoid touching it, but also that he might not be discomposed by its odor. Whilst he learnedly propounded the oracular Galen or Mundinus, a barber-surgeon, who held his position by a law of the university, dissected the organs with a razor, and held them up at arm's length to the view of a group of enthusiastic students.

The sixteenth century was the commencement of the golden age of anatomy. Jacobus Sylvius, Professor of Anatomy at Paris, made dissections of the human body by which he was led to make some alterations in the nomenclature, and to correct a few errors; but his attachment to ancient authority was so great that, like most of his predecessors and contemporaries, he preferred believing the structure of the human body had changed since the time of Galen, rather than suppose the latter had made mistakes. With Sylvius the idea first originated of injecting the bloodvessels.

He who may be viewed as the founder of human anatomy, in the spirit in which it is taught in our day, is Andreas Vesalius, born at Bruxelles, in 1514. So zealous was he in the pursuit of his favorite science, that to obtain materials for dissection he would sleep in the fields to rob the gibbet of its victim. As the bodies of malefactors were hung in chains, this was a difficult task to

perform, and had to be done by cutting off one limb after another, and then removing the trunk in pieces. Being detected in plundering a churchyard, to avoid the consequences of vulgar fury Vesalius was obliged to leave his native land. He went to Paris, and studied with Sylvius. Among the students he excited great admiration from the facility with which he could distinguish the different bones of the human skeleton by feeling when blindfolded. It was not only the larger bones which he could tell in this manner, but also those of the wrist and ankle, and whether they were right or left. After he commenced teaching, the lecture-room of Sylvius became almost abandoned; which, exciting the enmity of his master, he left Paris, and went to Italy. He taught anatomy at Bologna and Pisa, and obtained so brilliant a reputation that, in his twenty-third year, the Republic of Venice appointed him Professor of Anatomy in the University of Padua. In his twenty-ninth year, he published his great work, entitled *De Corporis Humani Fabrica.**

Vesalius was the first to oppose the blind veneration paid to the authority of Galen; and he pointed out many of the errors of this author, especially that his anatomical descriptions applied rather to apes than to man.

Many fables originated among the ignorant in regard to the actions of Vesalius; and in consequence of his upsetting so many of the errors of the ancients, to which his contemporaries tenaciously adhered, he excited so much envy and persecution, that he resigned his professorship, and accepted the position of physician to the Emperor Charles V. of Spain. He also held the same honorable relation to the successor of the latter, Philip II. In his new retreat, however, Vesalius failed to find peace, for he excited the envy and complaints of the Spanish physicians, and he finally left the court in disgust, burnt his manuscripts, and, at the age of fifty, died in great misery, during a pilgrimage to Jerusalem, which he had undertaken for the sin of having been an anatomist.

Gabriel Fallopius, a nobleman of Modena, was a pupil and follower of Vesalius. His investigations were carried on in the spirit of his teacher, whom he even excelled in correctness; and he has

* Basil, 1543. This was not illustrated by the pencil of Titian, as is frequently stated, but by a pupil of the latter, Joh. Stephanus von Kalkar.

always held a high reputation as an anatomist through his published works entitled *Observationis Anatomicæ.**

Bartholomäus Eustachius was a learned and zealous opponent to many of the views of Vesalius, as indicated in his *Opuscula Anatomica.*† He completed a series of anatomical plates founded upon his own dissections, but did not publish them, on account of poverty. After his death they were mislaid, and for a long time were supposed to have been lost; but one hundred and fifty years subsequently, they were found at Rome, and were presented by Pope Clement XI. to his physician Lancisius, who, also being an anatomist, published them with a text added by himself.

The impulse given to anatomical investigation by Vesalius, Fallopius, and Eustachius, was felt in all the enlightened parts of Europe, and the sixteenth and seventeenth centuries are remarkable for the number of persons who distinguished themselves by the cultivation of anatomy. Among them are the names of Berenger de Carpi, Nicholas Massa, Botal, Fabricius ab Aquapendente, Varolius, Arantius, Bauhin, Casserius, Spigelius, Ingrassias, Vidius, Glisson, Stenon, Willis, Winslow, Valsalva, Meibomius, de Graaf, Santorini, Diemerbrock, Vieussens, and Wirsungius.

An important event in the history of Anatomy and Physiology was the discovery of the circulation of the blood, by William Harvey, who was born in England in 1578. As previously stated, in the ancient schools, it was taught that the blood travelled to and fro in the veins, and the arteries conveyed air or vital spirits throughout the body. Galen detected the arteries contained blood, for, he says, if you stick them in a living animal, blood will spirt out.

Fabricius, a disciple of Fallopius, discovered the valves of the veins, and that they would permit the blood only to flow from the periphery of the body towards the heart, which led Caesalpinus and Servetus, of whom the latter is better known to you as an unfortunate victim of religious fanaticism, to suspect the true course of the circulation, but the credit of having fairly demonstrated it is clearly due to Harvey.

Nearly at the same time of the discovery of the circulation of the blood, Assellius rediscovered the lacteals, Rudbeck the remaining lymphatics, and Pecquet the thoracic duct.

* Venice, 1561.

† Venice, 1564.

Malpighi, born in 1628, Professor of Anatomy in the University of Bologna, and physician to Pope Innocent XII., was the first to employ the microscope in anatomical researches. Leeuwenhoeck and Swammerdam also contributed to the advancement of anatomy through aid of the microscope; and Ruysch increased our information by means of his minute vascular injections.

The science of anatomy was now considered an essential part of the education of every physician; in consequence of which the eighteenth and nineteenth centuries have been so remarkably fertile in discoveries, that the golden age of anatomy must be considered to continue in all its splendor.

Among the names of the illustrious anatomists who have just preceded us, are those of Haller, Morgagni, Blumenbach, Albinus, John Hunter, Meckel, Soemmerring, and Cuvier.

The present century has been the dawn of an entirely new era in the history of anatomy and physiology.

Through the genius of the philosophic Bichat, general anatomy was founded. His work entitled *Anatomie Générale*, published in Paris, in 1801, was the first treatise presented to the world on the tissues or general physical constituents of the body.

Improvements also have been made in the microscope, which render it the most valuable of all instruments in anatomical investigations. Through its means Raspail, Schleiden, and Schwann were led to discover the great fundamental fact that all living beings, from the green slime of the ditch to the noblest tree of the forest, or from the animalcule, invisible to the unaided eye, up to him who aspires to the likeness of divinity, are constructed from one, simple, physical form, now viewed as the characteristic of organization, and called the organic cell.

Many instances might be given to prove the great utility of the microscope in elucidating the structure and function of organs, and they will constantly occur in my course of lectures; but that you may not feel inclined to undervalue its merits, I will now illustrate them by a single example.

When I was a medical student, which was not very long ago, it was taught that veins and lymphatics possessed open mouths, in which resided what was called an inherent power of absorbing or sucking up liquids. The absorption of nutritive matter from our food, we were informed, took place through the mouths of the

lacteals, which opened at the extremities of the intestinal villi. It had been observed that different substances were absorbed with different degrees of facility by the veins and lacteals, and a hypothesis was invented to explain the phenomenon, called a vital selective power, and even its analogy to a mental endowment was indicated. An epithelium could be fairly demonstrated, continuous with the epidermis and lining the mouth and œsophagus; but was supposed very accommodatingly to cease at the cardiac orifice of the stomach, so as not to interfere with the intelligent mouths of the gastric and intestinal veins and lacteals. Since then, the microscope has revealed an epithelium lining the whole extent of the alimentary canal, even investing closely the intestinal villi; and it has also demonstrated that the vascular system is closed in all organs of the body, and in no position possesses open mouths upon free surfaces. These facts of course overthrew the old hypothesis of absorption, and have led to the true theory of the process. The physical phenomena of endosmosis and exosmosis are quite adequate to explain the introduction of nutritive matter into the vascular system; and, as the experiments of the accurate physiologist Matteucci show that endosmotic power varies with the organic constitution of every membrane, and with the chemical nature of the liquids employed in the process, so we can understand how the coats of the stomach and intestines, and the walls of veins and lacteals, may absorb different substances with different degrees of facility without the necessity of hiding our ignorance behind a hypothetical "vital selective power."

In speaking of endosmosis, it occurs to me that it would prove a most excellent subject for an experimental thesis, to observe whether some influence is not exerted upon the molecular constitution of substances in solution exposed to endosmotic action. Probably it may resolve the enigma, of what becomes of the gelatin, which forms so common a constituent of our food, and which the experience of physicians clearly demonstrates to be nutritive. Gelatin is never found in the blood, nor is it known what transformation it undergoes in passing through the intestinal mucous membrane into the vascular system. That endosmosis does exercise an influence upon the molecular condition of substances exposed to its action, I think is proved by a little experiment incidentally related by Mr. Quekett, the micro-

scopist. He states that if oxalic or phosphoric acid be added to lime-water, an opaque pulverulent precipitate is produced; but his brother found that if a piece of vegetable cellular tissue* be saturated with lime-water, and then placed in a weak solution of either of the acids mentioned, after a few days crystals are produced within the cells, which are stellate in the case of the oxalate of lime, and rhombohedral in that of the phosphate.

Probably endosmosis in the vegetable kingdom has more to do with the production of organic constituents from the inorganic world than we at present have reason to believe, and to me it would not be a matter of astonishment if attention to this subject would lead to the artificial production of certain organic compounds, like the alkaloids, etc. To return from this digression to our legitimate topic, I would farther add, in relation to the importance of the microscope, that it is in a great measure through its means that chemistry and pathology have become the inseparable associates of anatomy and physiology, which four fundamental branches of knowledge are the corner stones upon which is being reared an edifice for the three graces of our profession, Surgery, Obstetrics, and Practice, that can never tumble to ruin.

The great builders of this temple, who are our contemporaries, are Müller, Matteucci, Faraday, Liebig, Simon, Mulder, Carus, Kölliker, Todd, Bowman, Valentin, Wagner, Hyrtl, Ehrenberg, Henle, Lebert, Newport, Goodsir, Agassiz, Owen, Rokitansky, Lehman, Retzius and others.

In our own country, but little yet has been done for the advancement of Anatomy and Physiology; nevertheless we have had some excellent observers and teachers. Among the former are the names of Beaumont, Wistar, Allison, Rush, Gibson, Godman, Harlan, Wyman, and others.

One of the most distinguished teachers of anatomy in our country, and at the same time an accurate observer, was he whose loss we have just been called upon to mourn. Dr. W. E. Horner, my predecessor, taught anatomy to large bodies of zealous students, our fathers and friends, within this venerable university,

* The substance employed was a piece of rice paper, which consists of a slice of unaltered cellular tissue from the stem of a species of Æschynome.

for more than a generation of years. In him we have lost a faithful friend and conscientious instructor, and our profession a most industrious coadjutor.

Like all other departments of human knowledge, anatomy in its growth has accumulated a host of burdensome and useless names, which, in the student attempting to acquire, very frequently usurp a knowledge of the subject itself. An unfortunate disposition exists among mankind to mistake mere words for real knowledge, and truth is everywhere disguised by them. The ostensible object of technical names is to aid the memory and to avoid circumlocution in description, and such names are of most advantage and easily recollected when they express some character possessed by the object. Thus, the name extensor indicis expresses the function of this muscle; the semilunar valves, the form and function of the organs; the sterno-cleido-mastoid muscle, its connections, &c.

There are very many organs of the body which have from two to half a dozen, or even more, names, and these are used indiscriminately by different medical writers, thus producing a great amount of confusion. As instances of this, the agminated glands of the ileum are called also glandulæ Peyerianæ, sociae Peyeri, plaques of Peyer, associated follicles, follicular plates, aggregated glands, and plexus intestinales; and a portion of the brain is called mesocephalon, pons Varolii, tuber annulare, protuberantia annularis, protuberantia basilaris, nodus encephali, nodus cerebri, and commissura cerebelli.

Besides this great redundancy of names, to render the subject more uninteresting and difficult, authors, in mutual admiration, have attached the names of one another to different organs. Thus, we have such objectionable names as Schneiderian membrane for nasal membrane; ductus Wirsungius for pancreatic duct; antrum Highmorianum for antrum maxillare; Haversian canals of bones for vascular canals; valvulæ Fallopiæ, or Tulpii, or Bauhini, for ilio-colic valves; Brunnerian or Brunnian glands, for duodenal glands, &c. Names of this kind are very numerous in anatomy, and are worse than useless, as they require an effort of the memory to recollect them entirely independent of the objects themselves. Under these circumstances, it is not a matter of wonder that the student should consider anatomy a dry and

difficult science. Frequently I have found students quite well acquainted with the structure of an organ, who yet thought their knowledge incomplete because they did not recollect certain useless names. As an instance, which in a striking manner exhibits the absurdity of such names, in the course of an examination, I asked a gentleman, "What are those small orifices on the inner surface of the right auricle of the heart?" and his answer was, "They are the terminations of veins, but I do not recollect the name." He had attempted to recollect the useless name "foramina Thebesii."

But how is the evil to be remedied? These relics of a semi-barbaric, or so-called classical age, have crept into all our medical writings, and an acquaintance with them may be required so as to understand that which we read. This may be so, but as our most important object is to acquire a knowledge of the human body, and redundant and uncharacteristic names are found to be obstacles to our progress, these may be rejected until we have attained the end in view, when, if we please, we may study the synonyma, or refer to a dictionary for them, as occasion may require.

To render the anatomical course easier than usual, I had hoped to have a text-book ready for a guide, in which all uncharacteristic names, when others exist, and synonyma should be left out of the text and be placed in foot-notes or in a glossary at the end of the book. I have not yet had sufficient time to accomplish this object, but will try to have it ready by another season.

The course upon which we are about entering consists of four divisions, as follows:—

1. General anatomy or histology, which treats of the intimate physical constitution of organs. This is also called microscopic anatomy, because the ultimate structure is visible only by means of the microscope.

2. Special or systematic anatomy, in which the organs are arranged in systems and apparatuses, as the osseous system, ligamentous system, muscular system, &c., and digestive apparatus, &c., and their ordinary characters, such as form, color, &c., are described.

3. Regional or topographical anatomy, in which the body is divided into parts or regions, and all the organs within these,

from the most superficial to the deepest, are described in their relative position to one another. This department is of especial interest to the surgeon, and is also called surgical anatomy. I propose substituting this division for the ordinary recapitulatory lectures, as they will prove of essential service to the student whilst pursuing his dissections.

4. Physiological anatomy, in which the organs are described in relation to their functions. This division is intimately associated with general and special anatomy, and enters into our plan of instruction only so far as is necessary to a clear knowledge of the latter. In another relation, it is more amply treated than would be in my power by the Professor of the Institutes of Medicine.

Pathological anatomy might be supposed to require some attention from my chair, but it is only normal anatomy which I teach in its various relations to medicine, while abnormal or pathological anatomy falls within the province of the Professors of Surgery and Practice.

In conclusion, gentlemen, it shall be my earnest endeavor to impart to you as complete a knowledge of the human structure as the present elevated condition of the science will admit; and from what has been said, not only by myself but by your other teachers, I think you must be so fully convinced of the importance of anatomy to the profession you have adopted, that I may count upon your hearty co-operation.